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Corporate Taxation and Industrial Competitiveness: High-Technology Versus Mature Industries

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A Research Paper

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A Research Paper

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**Corporate Taxation and
Industrial Competitiveness:
High-Technology Versus
Mature Industries**

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Summary

*Information available as
of 15 April 1986 was
used in this report.*

Recent and planned foreign government tax changes will increase the competitiveness of foreign companies vis-a-vis US firms in both high-technology and mature industries. Among other things, these actions would increase the ability of foreign companies to maintain high levels of capital spending and R&D funding that enable them to keep up with state-of-the-art technology. Many European corporations, for example, are benefiting from recently reduced rates and more favorable treatment for reinvested earnings and R&D spending. Tax policy changes under consideration in Tokyo will reduce the financial burden on Japanese corporations and help compensate for the adverse impact of exchange rate changes on their competitiveness. These actions would come at a time when US tax changes may be adding to US corporate costs.

Our analysis of corporate taxation indicates that, at present, the tax burden on West European firms is generally less than that on US firms. In Japan, the situation is mixed—high-technology firms face a roughly comparable burden while mature firms are taxed at a higher level than US firms. We reached these conclusions on the basis of examining the electronics industry as a proxy for the high-technology sector and automobile producers as a proxy for mature industries. In examining these sectors we found that foreign tax codes are often less favorable than in the United States, but their impact was often less burdensome because of differences in the financial structure and health of each country's corporate sector. In the high-technology sector, for example, West European firms have distinct tax advantages over US firms because they are more diversified and their ties to financial institutions enable them to make greater use of debt.

Although Japanese high-technology firms face higher tax rates than US firms, their greater use of debt also offsets this disadvantage. Japanese electronics firms have debt-to-equity ratios 2 to 5 times those of US electronics firms while the ratios of European firms are often 10 times as great. Long-established banking relationships and government loan guarantees enable foreign conglomerates to make greater use of tax-favored debt to fund their investments rather than using equity markets as do US companies. Moreover, the risk and potential loss of any one investment is small compared to the overall activities of the firm. Greater diversification also tends to mask the importance of narrowly focused foreign tax measures—foreign incentives could be very important for certain kinds of investments but the tax savings for large firms may be relatively modest.

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We conclude that mature industries in Japan are taxed more heavily than in the United States and Western Europe—in large part because they have more income and profits to tax. In the automobile sector specifically:

- Japanese firms are the most heavily taxed. They are subject to higher nominal tax rates and a less favorable capital recovery system than those in other countries, and, unlike most other Japanese firms, they finance most investments internally.
- European auto firms, with the exception of those in West Germany, face little or no tax burden—generally as a result of large losses. These losses and high debt levels should guarantee several more tax-free years for French and British automakers.
- Although West German firms face higher tax rates than US firms, these rates are offset by tax benefits that result from financing a large share of their capital expenditures with debt and West Germany's elimination of the double taxation of dividends.

Internally, the West European and Japanese tax structures do not seem to favor mature over high-technology industries to the extent that the US structure does. We believe, however, the sectoral equality can be attributed more to greater diversification and capital intensity of foreign electronics firms than to more neutral tax regulations. Foreign electronics firms, like companies in more traditional capital-intensive sectors—such as the auto industry—benefit from the bias conferred by accelerated depreciation. However, the increasing capital intensity of US semiconductor firms and the proposed elimination of the investment tax credit will significantly reduce the relative bias that now exists in the US system in favor of mature industries. Again this conclusion results from our assessment of the automobile and electronics industries as proxies for the two sectors.

The relative tax burden on auto and electronics industries around the world could change significantly depending on the outcome of tax reform proposals both here and abroad. Tax changes in any country affect not only domestic firms but all international competitors, and many foreign firms may regain the tax advantage they enjoyed during the 1960s and 1970s. The relative tax burden on Japanese corporations could drop substantially if reform measures currently under discussion in Tokyo are carried out. Proposed tax changes in Japan and the United States could indirectly alter

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the competitive position of European firms—decreasing their tax advantage relative to Japanese industry and increasing their tax advantage relative to some segments of US industry.

Relative tax reductions for Japanese automakers could increase their ability to fund large investments, expand their US production capacities, and compete head-on with US automakers in upscale markets. Although some US high-technology firms may benefit from US tax reform efforts, their ability to compete in world markets could be threatened by Japanese companies operating with much lower tax burdens. We believe the risk would be greatest for US merchant semiconductor manufacturers that have benefited greatly from investment and R&D incentives and might be particularly susceptible to changes in tax policies that lessen incentives for investments in advanced semiconductor manufacturing equipment. Although extension of our results must take into account the special features and regulations affecting other industries, we believe that other mature and high-technology firms will be affected in a manner similar to the auto and electronics industries.

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Scope Note

Tax policy exerts a strong influence on corporate behavior, but the impact of taxes is frequently highly variable—particularly as it affects different sectors of the economy. Furthermore, tax policy is perhaps the easiest factor for governments to manipulate and over which corporations can lobby, although it generally plays a smaller role in international competitiveness than exchange rates or labor costs. This paper examines the impact of corporate tax laws on high-technology and mature firms within the context of the particular corporate environments that exist in France, Italy, Japan, the United Kingdom, West Germany, and the United States. Actual tax burdens are calculated for electronics and automobile firms that are in many ways typical of high-technology and mature industries.

This paper represents one aspect of the research currently being done on international competitiveness. A previous paper, [REDACTED]

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[REDACTED] examined the relative tax burdens of electronics firms in five countries. This paper updates those results, includes electronics firms in two additional countries, and examines the relative tax burdens on automobile firms in those countries. Particular attention is paid to the relative tax burden imposed on the two industries in each country and the problems that may ensue if the industries face unequal burdens.

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Corporate Taxation and Industrial Competitiveness: High-Technology Versus Mature Industries

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Taxation of High-Technology and Mature Industries

The Formulation of Tax Policy

The level of corporate taxation in most countries is more frequently a function of competing political claims and the need to fund government spending programs rather than a desire to enhance international competitiveness:

- In recent years, Japan has reduced its reliance on tax policy to promote industries. Current measures are designed to encourage research and development and the acquisition of high-technology assets by small and medium-sized firms.
- France, West Germany, and Italy have used the tax code to promote regional development, although in recent years there has been some emphasis on encouraging investment and research and development (R&D) spending in France and West Germany.
- The United Kingdom sought to encourage capital formation in the 1970s by allowing the immediate writeoff of most assets but is currently moving toward a system which combines economic depreciation with low tax rates.
- The United States has sought to encourage R&D and capital formation—particularly purchases of equipment—through accelerated depreciation and investment and R&D tax credits.

At the margin most countries do, however, seek to encourage the development and growth of specific industrial sectors through the corporate tax code.¹

¹ The major features of the corporate tax systems in France, Italy, Japan, the United Kingdom, West Germany, and the United States are outlined in appendix B.

Does Tax Policy Affect Investment?

In addition to normal depreciation allowances, many countries provide grants, special deductions, or tax credits to encourage the development and growth of certain sectors or types of corporate activity. Because technological capability is a strong determinant of competitiveness, governments have implemented R&D credits to provide important writeoffs for technology development. In order to increase the international competitiveness of their firms, many countries have also used investment incentives to encourage growing sectors—particularly high technology.

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There is strong theoretical support for the idea that tax policies have a direct effect on investment. Reductions in taxes tend to increase investment both by reducing the cost of using capital relative to the cost of using labor and by increasing the available after-tax income of firms. Furthermore, tax measures are particularly attractive as incentives because they leave a large measure of discretion for spending decisions in the hands of individual firms.

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Empirical support for the impact of specific tax changes on the level of investment, however, is weaker. It is difficult to isolate the impact of tax incentives because they are only one factor in investment decisions—also to be considered are: predicted demand for final output, the price of capital, real interest rates, and the potential for substitution between capital and labor. Furthermore, since tax and nontax factors are likely to vary from industry to industry, the impact of taxes will also vary by sector.

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Within the last decade, a desire to reduce large budget deficits has led Japan to limit its use of tax incentives to aid industry. During the 1950s and early 1960s, Japan used tax policy to aid the development of basic industries such as steel, shipbuilding, and petrochemicals. In the early 1960s, the focus of Japan's assistance through the tax code shifted to industries important to international competitiveness. Thus, the infant Japanese auto industry received preferential depreciation treatment in the 1960s and, until 1976, additional depreciation allowances if certain export performance criteria were met. In the late 1960s and 1970s, Japanese computer firms benefited from special first-year depreciation writeoffs and from tax-free reserve provisions.² With the exception of the tax-free reserve program, tax incentives designed exclusively for the computer industry were phased out in 1979. []

Current Japanese tax incentives are designed to encourage research and development and the diffusion of high technology. For example, Japanese tax law grants a 20-percent tax credit for increases in R&D spending over the highest previous level and purchases of R&D assets in basic technologies—advanced materials, biotechnology, advanced electronics, robotics—are eligible for a 30-percent first-year writeoff or a 7-percent tax credit. Moreover, Tokyo has sought to encourage the diffusion of high-technology products to small and medium-sized companies by providing an additional 6-percent tax credit for purchases from a list of 157 items in the biotechnology, advanced materials, and electronics areas. []

European countries have used tax incentives mainly to encourage regional development; those in Italy and West Germany are particularly generous. Incentives in the Italian tax code can cut income taxes by more than half, for up to 10 years, for investments in southern Italy, while West German tax laws provide special depreciation writeoffs for investments in West Berlin and East German border regions. In recent

² Reserves may be established for software development costs and for expected losses resulting from computer sales to the Japan Electronic Computer Corporation (JECC). Because a current tax deduction may be taken for amounts credited to these reserves in anticipation of future expenses, current tax liability is reduced and cash flow is enhanced. []

years, France and West Germany have instituted incentives to encourage R&D and capital formation. For example, a change in French tax law this year will increase the tax credit for new research expenditures to 50 percent, and the maximum credit will be increased from 3 to 5 million francs. West Germany provides a 40-percent special depreciation for investments in equipment used for R&D purposes and a 7.5-percent investment subsidy. []

Currently, many countries are seeking to improve the fairness and simplicity of their tax systems:

- Former Prime Minister Fabius of France, in instituting yet another tax regime last year, argued that the tax code should treat all sectors equally and deplored the fact that tax incentives have been changed so frequently that businessmen are faced with an unstable tax environment.
- Japan is engaged in the first major review of its tax system since 1952. Prime Minister Nakasone has stated that he wants to introduce a large-scale indirect tax, such as the value-added tax (VAT), and reduce the individual and corporate tax burden, which corporate leaders have long claimed is the highest in the world.
- West German tax experts have argued that the German tax system is too complex and unduly favors capital-intensive industries through the use of accelerated depreciation and hindered investment in new high-technology firms through high nominal tax rates.

In addition, France, the United Kingdom, West Germany, and the United States are looking carefully at the differential impact that tax systems may have on different sectors of the economy. []

High-Technology and Mature Industries

High-technology companies, particularly those in Japan and the United States, argue that their national tax codes discriminate against them by failing to

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What Is High Technology?

High technology is an often used but seldom defined concept. A common though simplistic definition classifies an industry as high tech if its ratio of R&D expenditures to net sales is twice the national average. US industries meeting this definition of high tech include: drugs, office and computing equipment, electronic components, aircraft, and aircraft parts. Industries that fail to meet this simplistic definition of high technology, such as automobiles and steel, are often called mature or even smokestack industries. Better indicators of high technology might be the degree to which a firm's activities are associated with technical progress or the degree of risk associated with its projects, but these factors are generally not conducive to cross-country comparisons.

To compare the impact of taxation on the activities of high-technology and mature industries across countries, we have selected for our sample foreign companies involved in activities similar to those of US high-technology and mature firms. It must be noted however, that various foreign firms may fail to meet the definition of high tech or mature. For example, the export-driven Japanese auto industry may not qualify as mature, and more diversified foreign electronics firms may fail to meet the R&D criteria.

Moreover, it is increasingly difficult to identify corporations as operating in particular sectors:

- *Japanese electronics firms operate in areas as diverse as semiconductor device manufacturing and power plant production.*
- *Fiat receives substantial (25 percent) revenues from nonautomotive sales.*
- *Both Ford and GM manufacture semiconductor devices and have aerospace subsidiaries.*

High-technology firms make many of the same investments as do mature firms—that is, land, buildings, and office equipment—while many mature firms have incorporated high-technology manufacturing processes, such as computerized assembly lines, into their operations. Furthermore, while high-tech firms spend a greater proportion of their resources for R&D, the absolute level of R&D spending by mature firms is often much greater. Nevertheless, by examining the relative tax burdens of predominantly mature firms and firms predominantly engaged in high-technology activities, a greater understanding of potential biases in the tax code can be gained.

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account for the special characteristics of high-technology firms and their investments. Although the differences are narrowing, high-technology firms still encompass unique characteristics that make them subject to tax code biases. These biases occur on three counts:

- *Depreciation provisions that favor capital-intensive industries and fail to account for the rapid obsolescence of high-technology investments.*
- *The preferential tax treatment accorded debt that favors companies less reliant on equity capital such as foreign conglomerates.*
- *Tax-loss provisions—by failing to provide treatment similar to that accorded taxes on profits—lessen the impact of tax incentives designed to encourage investment.*

Depreciation. High-technology firms argue that they are disadvantaged by tax systems that charge high nominal rates, which cut into the profits needed to make a high-tech investment attractive, and then give special treatment to capital through accelerated depreciation. This is a problem because high-technology firms typically are not as capital intensive as mature firms. Moreover, depreciation allowances, which are based on physical obsolescence, are often of little value to high-technology firms because their physical assets are frequently made obsolete by technological advances. While all firms benefit from accelerated depreciation, relatively greater benefits are provided to smokestack industries.

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Depreciation systems in France, Japan, West Germany, and the United States provide much better treatment for investments in machinery and equipment than for investments in buildings and structures, and thus could be detrimental to sectors that use relatively more structures than equipment.³ Firms in growing, high-technology sectors typically invest relatively more in structures than do firms in mature or declining industries that are more interested in replacing outmoded equipment than building new factories. Our analysis indicates, however, that this bias is likely to be a problem only for specific US electronics corporations. The diversification of foreign electronics has resulted in a relative mix of equipment and structures assets very similar to that of their auto counterparts. Within the United States, the increasing capital intensity of semiconductor manufacturers is eliminating differences in their asset mix from that of US automakers. In our sample of companies, only Hewlett-Packard is significantly disadvantaged by the tax bias in favor of equipment. []

On an overall basis, Italian, West German, British, and US firms are allowed roughly comparable depreciation writeoffs. Benefits given to French firms are slightly more generous, while those available to Japanese firms are slightly less generous. European firms, however, may derive some benefit from their depreciation systems since they are generally "front-loaded"—allow greater first-year writeoffs—and thus provide significant cash-flow benefits. Under current rules, French, West German, and British firms typically write off 2 to 3 times as much depreciation for equipment in the first year as their US counterparts. Front-loaded systems can be particularly important for high-technology investments that depreciate more rapidly than other assets due to technological obsolescence.⁴ []

³ Depreciation allowances in the United Kingdom give a smaller preference to equipment, while the system in Italy creates a small bias in favor of structures. Half of the bias in the US tax system is due to the availability of the investment tax credit only for purchases of equipment. []

⁴ Although the availability of the US investment tax credit for equipment reduces this gap, foreign firms often have special incentives available to them, such as regional incentives, special depreciation for equipment used for R&D, and inflation adjustments which are equally lucrative. []

Debt and Taxes. High-technology firms claim that they are disadvantaged by tax systems that allow a deduction for interest payments but not for dividends—the return to equity. US electronics firms, as well as new companies in high-technology industries, rely to a greater extent on equity financing than firms in such traditional sectors as automobiles. In this sense they are somewhat disadvantaged relative to mature industries in the United States. They are also disadvantaged relative to foreign electronics firms that have higher debt-to-equity ratios.⁵ []

On an overall basis, most foreign firms reap a large tax advantage through their extensive use of debt financing. Firms in Japan, France, West Germany, Italy, and the United Kingdom operate with debt-to-equity ratios 2 to 10 times those of comparable US firms. Among foreign firms, Toyota, which is virtually debt free, is one of the few exceptions to the heavy use of debt.⁶ []

Diversification and Cyclical Earnings. An important factor in the effectiveness of tax incentives is the degree of corporate diversification and the ability to use losses from unprofitable subsidiaries to offset gains from profitable subsidiaries. For example, most industry experts believe that diversified Japanese electronics firms have funded semiconductor R&D and capital investments—particularly during market recessions—from other profitable lines of business. Greater diversification can also mask the importance

⁵ Many analysts have suggested that foreign electronics firms are able to operate with higher debt levels than US electronics firms because they have developed longstanding relationships with major banks or corporate groups, are perceived to be less risky because of greater diversification, and/or have access to government loan guarantees and funding. Factors contributing to relatively low debt-to-equity ratios in the United States include reduced taxes for capital gains, a greater risk of bankruptcy, and the need to maintain high bond ratings to reduce the cost of borrowing. []

⁶ Other notable exceptions include Matsushita and Kyocera—companies that, like Toyota, are controlled by a single family. It is unclear why these firms differ from the usual Japanese pattern of a heavy reliance on debt. Some analysts have suggested that Toyota avoids the use of debt in order to reduce its susceptibility to government pressures, exerted through financial institutions, to hold back exports or restrain its domestic market share. []

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of narrowly focused foreign tax incentives. Foreign rules can be much more generous than broad US incentives for some investments, but the tax savings is small relative to the size of the firm. Although foreign regulations on consolidated tax returns are more restrictive than US rules, annual reports reveal that most major foreign corporations have received permission from their governments to file consolidated returns. []

Tax incentives designed to provide additional tax relief may be of little use to companies that are relatively unprofitable and thus paying little tax anyway. For example, many new high-technology firms lack the steady flow of profits needed to take advantage of investment tax incentives. Although most countries tax corporations on their profits, equal treatment is seldom accorded to their losses—there is no immediate rebate for current losses incurred. Companies that have experienced several years of losses, or are just beginning business, usually have little taxable income and, thus, little to gain from additional tax relief. In recent years, the inability to take advantage of tax incentives has been a problem not only for high-tech startup firms but also for mature firms in the auto and steel industries. Indeed, the tax losses of many mature firms have built up to the point that they will not pay taxes for many years to come. US loss provisions, however, are much more favorable than those granted to foreign firms. Losses of US corporations may be carried back three years while some countries allow no loss carryback (see appendix B). The loss provisions have been of great assistance to US auto firms over the last five years. []

Tax Comparisons

Our analysis (table 1) of three different measures of tax burdens—the marginal effective tax rate, the average effective tax rate, and the ratio of taxes to sales—shows that:

- US automobile companies currently have a slight tax advantage over Japanese automobile companies—due largely to the 1980-82 US auto recession

and recent US tax changes. The tax burden of most European producers is significantly less than that of US producers.

- The tax burden of Japanese and West German electronics firms is currently comparable to that of US firms. Taxes are somewhat less significant in Italy, and, as a result of large losses and the heavy use of debt, relatively insignificant for French and British electronics firms.

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- Between sectors—automobiles and electronics—there appears to be more equal treatment of electronics and automobile firms in foreign countries. []

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In practice, however, several factors would tend to reduce the actual tax burdens of foreign firms relative to US firms:

- A larger portion of the foreign income of French, Italian, Japanese, West German, and British firms is exempt from tax or subject to lower tax rates than domestic income.
- Large loss carryforwards for Thomson, Peugeot, Renault, and BL guarantee that those firms will pay little or no taxes for many years to come, so that in effect their marginal tax rate is close to zero.
- French, Italian, Japanese, and West German accounting principles, which are generally geared toward minimizing tax payments, may give their firms an additional tax advantage by allowing greater flexibility in declaring expenses.^{7 8}

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⁸ An offsetting accounting advantage of US firms may come in the inventory valuation area because firms in the United Kingdom, France, and West Germany are generally not permitted to use the last-in, first-out (LIFO) method to value inventories. Under LIFO, goods sold are evaluated at the most current, and generally highest, price, thus reducing taxable income. Firms in France and West Germany are, however, allowed market-fluctuation reserves to adjust for the impact of inflation. []

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Table 1
Measures of the Corporate Tax Burden

Percent

	Marginal Tax Rate— Equipment ^a	Marginal Tax Rate— Structures ^a	Marginal Tax Rate ^a	Average Tax Rate ^b	Taxes as a Share of Sales ^c
France ^d					
Thomson	21.2	31.2	23.7	8.8	0.3
Peugeot	8.1	12.2	8.8	NEGL	NEGL
Renault	11.3	16.6	12.3	NEGL	NEGL
Italy ^e					
Olivetti	34.4	31.5	34.0	9.4	1.6
Fiat	37.4	34.2	37.1	12.5	0.8
Japan ^f					
Fujitsu	55.8	57.8	56.2	42.8	5.2
Hitachi	67.4	69.8	67.9	40.8	4.3
NEC	40.6	42.0	40.9	31.2	2.6
Nissan	66.9	69.2	67.4	39.3	3.1
Toyota	67.5	69.8	67.8	48.6	5.7
United Kingdom					
ICL	22.3	22.6	22.3	7.1	1.0
BL ^d	8.2	8.3	8.2	4.0	0.2
West Germany ^g					
Siemens	38.8	47.0	39.6	33.7	2.7
Volkswagen	35.7	42.2	36.2	23.5	3.0
United States					
Hewlett-Packard	15.5	50.3	32.2	36.9	6.4
IBM	12.2	39.7	20.2	40.6	10.4
Motorola	15.0	48.8	23.1	23.7	2.2
Texas Instruments	13.5	43.8	28.7	32.1	3.4
Chrysler	12.9	41.7	18.7	1.1	0.1
Ford	12.4	40.2	12.4	29.2	2.7
General Motors	14.6	47.3	19.5	27.0	2.3

^a Marginal calculations represent a point estimate of the impact of generally available domestic tax provisions on in-country investments, given individual country and company characteristics such as use of debt financing, relative use of equipment versus structures, dividend payout rates, inflation rates, and desired aftertax rates of return. The company and country characteristics employed are reported in appendix A.

^b Generally, averages based on publicly available financial reports during the 1979-83 period after adjusting for different accounting, depreciation, and financial practices. Detailed calculations are included in appendix A.

^c Ratio of actual tax payments to sales; averages for the same period for which average tax rates are calculated.

^d Large loss carryforwards for Thomson, Peugeot, Renault, and BL lessen the accuracy of marginal tax rate calculations because future profits are sheltered by past losses. Until past tax losses are eliminated the marginal tax rate of these companies is effectively zero. In Peugeot's last profitable year (1979) the firm's average tax rate was 26.5 percent and the ratio of taxes to sales, 1.6 percent. In Renault's last profitable year (1980) the firm's average tax rate was 19.4 percent and the ratio of taxes to sales, 1.1 percent.

^e Italian companies are from time to time allowed to take extra depreciation to adjust for the impact of inflation. These measures are unlikely to affect marginal incentives, however, as they cannot be anticipated.

^f The marginal tax rate for equipment that qualifies for the special 7-percent investment tax credit would be approximately 10 to 16 percentage points lower than that for nonqualifying equipment.

^g The 7.5-percent investment subsidy (20 percent for investments of less than DM 500,000) would reduce the marginal tax rates of both Siemens and VW to approximately 24 percent.

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Measuring Tax Burdens

A number of measures have been developed to measure the impact of taxes on the firms. Because no one measure is suited to all circumstances, or even agreed upon by all analysts, we have used corporate financial data to calculate the three most commonly used measures for each firm—the marginal effective tax rate, the average effective tax rate, and the ratio of taxes to sales. While no measure is perfect, we can gain useful insights into the effect of taxes on investment by comparing these three measures. A detailed methodology for the calculation of tax rates is contained in appendix B.

The marginal effective tax rate measures the tax bite on each additional dollar of investment. Tax changes that decrease the marginal rate—lower nominal rates, increased depreciation allowances, special investment incentives—encourage investment, while changes that increase the marginal rate discourage investment. The marginal rate is generally considered the best measure of the incentive impact of taxes, but cannot be designed to include every feature of the tax code and is not a particularly reliable measure for companies that are only marginally profitable.

The average tax rate, on the other hand, is a measure of the impact of taxation on the firm's cash flow and takes into account all features of the tax code. The

average rate may be a more meaningful measure for firms with little or no taxable income, and thus unable to take advantage of tax incentives, or firms that traditionally finance a large portion of investments with debt. The average rate, however, may not be a particularly reliable measure of the impact of taxes on future investments even though it may be the most accurate measure of the actual impact of taxes on firm resources.

The ratio of taxes to sales is preferred by many analysts as a substitute for the average tax rate since international accounting differences and differences in firms' financial structures cannot be completely adjusted for in comparing average rates. While the ratio of taxes to sales is the simplest indicator of the drain that taxes place on a firm's resources, it is a relatively poor indicator of the impact of tax incentives on investment. Moreover, for any given level of sales, the measure will be higher for some industries than others simply because some industries are more profitable. For example, high-technology firms tend to be more profitable than mature firms, at least in part because greater returns are required to compensate for greater risks.

The tax burden of US firms, on the other hand, is likely to rise because the US R&D tax credit expired at the end of 1985 and current US tax reform proposals would increase the corporate tax burden. Moreover, US automakers will see their burden rise because they have eliminated the large loss carryforwards accrued over the 1980-82 period.

Cross-Country Comparisons

On an overall basis, the tax burden of US automobile and electronics companies is not out of line with that faced by their Japanese and West German counterparts. Each tax system has certain advantages and

disadvantages (see table 2 for summary). As a result of their poor performance over the 1980-82 period and US tax changes instituted since 1981

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Table 2
Sources of Tax Advantage and Disadvantage:
Differences from US Standards ^{a, b}

	Advantages	Disadvantages
France ^c	High debt levels Depreciation—equipment Diversification (Thomson)	Depreciation—structures
Italy	Regional incentives (Olivetti) Double taxation relief Depreciation—equipment and structures Diversification (Fiat)	Lack of R&D incentives Lack of investment incentives
Japan	High debt levels (Electronics) Diversification (Electronics)	High nominal tax rates Low debt levels (Toyota) Depreciation—equipment and structures No general investment incentives
United Kingdom	Low nominal tax rates High debt levels Double taxation relief (ICL)	Lack of R&D incentives No general investment incentives
West Germany	High debt levels Double taxation relief Regional incentives Diversification (Siemens)	High nominal tax rates Depreciation—structures

^a Judgments pertain to individual country differences with the United States and should not be used for cross-national comparisons with reference to individual items. Assessments with respect to foreign R&D incentives assume enactment in the United States of provisions similar to those which recently expired.

^b Advantages and disadvantages apply to all firms included in the study unless specially identified in parentheses.

^c Large past losses might be considered a source of tax advantage for French companies as they will ensure that future profits will be sheltered from taxes for several years.

In recent years, an additional factor leading to higher marginal rates in Japan has been the financing practices of major automakers. Our analysis of corporate annual statements indicates that Nissan has a debt-to-equity ratio almost identical to that of General Motors, but Nissan has been able to fund all new investments over the past five years out of working capital. Although GM funded investments internally throughout the 1970s, poor performance in the 1980s made this practice impossible. As the profits of US automakers have become strong and the firms have resumed the practice of funding investments out of retained earnings, their tax rates once again rose.

The marginal tax rates of Volkswagen and Fiat also appear higher than those of US firms, but the inclusion of large regional tax incentives—generally not available to the same extent in the United States—

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greatly reduces the burden on qualifying West German and Italian investments.¹⁰ Moreover, West Germany provides significant cash grants for new investments. We estimate that these subsidies reduce the marginal tax rate of Volkswagen to approximately 24 percent and regional incentives could reduce the rate below those currently faced by US automakers. Our average tax rate calculations indicate that corporate taxes are less of a drain on the resources of VW and Fiat than they are on Ford and GM. Indeed, analysis of VW's financial statements indicates that the firm continues to fund a major portion of its investments with tax-favored debt—further augmenting a debt-to-equity ratio that is already more than 3 times that of GM—thus adding to their tax advantage. []

In the case of BL, Peugeot, and Renault, all three measures indicate a lower tax burden—primarily the result of a high reliance on debt and large losses over the past few years. The large losses of French companies will eliminate any tax liability for many years to come. Moreover, press and corporate reports indicate these firms have received large government subsidies that far outweigh any taxes they have paid. []

Electronics. Although Japanese electronics firms suffer from the same tax disadvantages, relative to US producers, as Japanese auto firms—high nominal tax rates and less favorable depreciation practices—some electronics firms, most notably NEC, offset this situation with their heavy use of debt. Hitachi, for example, has a debt-to-equity ratio 2-to-3 times that of US electronics firms although new investments are now being funded entirely with internal funds. These changing financial practices are the primary reason that Japanese marginal tax rates far exceed average Japanese tax rates. []

The ability of Japanese electronics firms to operate with higher debt levels than their US counterparts may provide them significant cash flow benefits since taxes are less of a drain on corporate resources. Other

¹⁰ The impact of regional incentives on marginal tax rates would vary considerably depending on the particular location and type of the investment. On the basis of the past use of regional incentives by VW and Fiat, we estimate that these tax benefits would lower the firms' marginal tax rates by at least 5 to 10 percentage points. []

measures of tax burden—particularly the ratio of taxes to sales—indicate that most Japanese companies reap significant benefits from their highly leveraged position. The ratio of taxes to sales for Fujitsu, for example, is half that of IBM.¹¹ []

Siemens, like its Japanese counterparts, suffers from high nominal rates and unfavorable depreciation allowances for structures. Unlike its Japanese counterparts, however, Siemens continues to finance a large portion of new investments with tax-favored debt, augmenting a debt-to-equity ratio that is already more than 3 times that of Hitachi's.¹² Siemens's stockholders are also helped by German tax laws that eliminate the double taxation of dividends.¹³ As a result, Siemens's marginal tax rate is nearly 30 percentage points lower than that of Hitachi, and the inclusion of regional incentives and cash grants would push the rate near that of US electronics firms (table 1, footnote G). []

Other European electronics firms—Olivetti, Thomson, and ICL—appear to have a decided tax advantage: []

- In addition to large regional incentives and double taxation relief, Italian tax law allows Olivetti to revalue assets to adjust for high inflation and then calculate depreciation on the basis of the higher values.

¹¹ Of the firms included in our sample, Fujitsu is most comparable to IBM in terms of product lines and overall corporate activities. The ratios of taxes to sales for other comparable firms—for example, NEC, Motorola, and Texas Instruments—are roughly equal because of offsetting differences. NEC derives even greater benefits from its highly leveraged position—it has a debt-to-equity ratio more than 6 times that of TI and Motorola—than Fujitsu. However, TI and Motorola, whose earnings have been depressed in recent years, derive a greater relative benefit from investment and R&D tax credits than IBM. []

¹² Of the Japanese firms studied, Siemens is most similar to Hitachi in terms of overall size and diversification. []

¹³ In European countries (and to a lesser extent in Japan) shareholders may claim a credit against their individual taxes for part or all of the corporate tax deemed to have been paid on dividends. In the United States, on the other hand, shareholders are granted only a relatively insignificant dividend exemption. []

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- With the help of government loan guarantees, Thomson is able to fund half of its capital expenditures with debt, and the firm's annual reports indicate tax losses built up over the past five years will greatly reduce any future tax liability.
- ICL is able to finance one-third of its investment with debt and is further aided by low nominal tax rates—an advantage that will increase in 1986 when nominal rates drop another five points.
- Differences among *British* firms are due almost entirely to financial structure—BL funds less than a fourth of its investments internally while ICL funds about two-thirds of its capital expenditures out of retained earnings. ICL pays out a modest share of its earnings as dividends reaping a small advantage from UK double taxation relief.
- Siemens of *West Germany* finances a larger share of its investments internally than Volkswagen but also pays out a larger share of its earnings in dividends—taking advantage of German double taxation relief. Analysis of corporate financial statements indicates West Germany's regional, investment, and R&D incentives enabled Siemens to save more than \$115 million annually in taxes during 1981-83 whereas Volkswagen was able to reduce its taxes for 1983 by more than \$70 million.

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Within-Country Comparisons

With a few exceptions, electronics and automobile firms face relatively comparable tax burdens in foreign countries but not in the United States. Exceptions among foreign firms are due largely to different financing practices. For example, Toyota has a relatively high tax burden because it has virtually no debt, while NEC has a relatively low tax burden because it makes extensive use of debt. In some cases, however, the overall neutrality between sectors in foreign countries masks offsetting differences:

- In *France*, Peugeot and Renault face a lower marginal tax rate than Thomson because they fund three-fourths of their capital expenditures with debt whereas Thomson funds only half of its investments with debt. Thomson may also be disadvantaged because it invests slightly more in structures—French depreciation allowances for structures are less favorable than the US accelerated cost recovery system (ACRS).
 - In *Italy*, a greater proportion of Olivetti's income is subject to reduced tax rates under regional incentive programs while Fiat's greater interest burden provides it an offsetting advantage.
 - Financial structure provides the only significant tax difference among *Japanese* firms, but the differences are more company specific than industry specific. In our sample, Fujitsu, Hitachi, and Nissan have roughly the same tax burden; Toyota, which has little debt, and NEC, which has a lot of debt, appear to be the outliers.
- Within the United States, electronics firms are disadvantaged by a heavy reliance on equity capital, and they must contend with the tax bias favoring capital-intensive industries. US electronics firms tend to have higher tax burdens than US automobile firms because they are more labor intensive, invest relatively more in structures, and finance a greater portion of investments with internal funds. Although foreign tax systems generally contain the same biases as the US system, the bias among sectors is eliminated in practice because foreign firms tend to be more similar in their financial and physical assets characteristics. In large measure, this similarity is due to the greater diversification of foreign electronics firms and their ability to operate at higher debt levels than US electronics firms.

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Future Trends and Implications

Lower Burdens, Increased Neutrality

Many countries are reexamining their tax systems—reform measures have already been decided upon in France and the United Kingdom, while changes in Japan and West Germany are still being debated.

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Recent elections in France and those upcoming in West Germany may play an important role in future changes, but two major themes run throughout the tax reform debate in every country: a shift from direct to indirect taxation, and a shift from accelerated depreciation in favor of lower nominal rates. []

Reform measures currently under discussion in Japan would substantially reduce the corporate tax burden. Press reports indicate the Ministry of Finance wants to reduce the effective tax rate on corporate income to 40 percent from approximately 52 percent. Moreover, proposals calling for the introduction of a large-scale indirect tax, such as the VAT, which might provide even greater incentives for personal saving, would further reduce interest rates and the cost of capital. Tokyo is likely to retain current tax measures aimed at encouraging R&D and the acquisition of high-technology assets by small firms, but the overall effect of future tax changes is unlikely to change the relative neutrality in tax treatment of mature and high-technology firms. []

Tax changes recently introduced in France and the United Kingdom are unlikely to have a significant effect on those countries' major electronics and automobile firms. Indeed, Thomson, Peugeot, Renault, and BL have amassed sufficient tax-loss carryforwards to assure they will escape most tax liability for several years. Tax changes under consideration in Italy and West Germany are likely to be minor and, in the case of West Germany, will not take place before the 1990s. There may, however, be a modest beneficial impact on small high-technology and service firms in each of these countries. []

France. Legislation enacted by the Socialist Government in 1985 will replace the current system of accelerated depreciation in France with a general tax-rate cut for reinvested profits this year. Profits that are reinvested will be taxed at 45 percent rather than the standard 50-percent rate. In the aggregate, Paris expects the tax change to be revenue neutral but reduce the bias in favor of capital-intensive industries and provide modest assistance to small high-tech companies. []

The narrow margin of victory by conservatives in the 16 March French parliamentary elections is likely to limit the scope of future corporate tax changes. The joint platform of the two major conservative parties—the neo-Gaullist RPR and the center-right UDF—called for a cut in the professional tax and reformed tax treatment for savings and investment but delayed more extensive reform and tax cuts previously proposed by the RPR. Prime Minister Chirac, head of the RPR, is known to favor reductions in marginal tax rates, but his slim control of the parliament may inhibit his ability to pursue innovative economic policies. []

Italy. Italy's regional incentive package has been extended through the end of 1986, pending approval of an enhanced bill. The expanded incentive package would provide more generous cash grants, increase eligibility for soft loans, and raise the exemption from corporate taxes for new investments. Under the new program, companies locating in southern Italy would be totally exempt from income taxes for 10 years. []

Press reports indicate the Italian Chamber of Deputies is considering an investment tax measure that we estimate would approximate a 6.5-percent tax credit for capital expenditures in excess of depreciation. Although the measure is aimed at healthy, growing companies that make profits, the corporate lobby is seeking to modify the bill so that a wide cross section of industry would benefit. State reporting indicates that there is also an interest within the government in shifting from direct to indirect taxes, but no specific proposals have been introduced. The enhanced regional and investment incentives are likely to provide greater benefits to small high-tech and service companies than to large firms like Fiat and Olivetti. []

Japan. []

[] The Keidanren has long claimed that Japanese corporations face the highest tax burden in the world. Indeed, Tokyo has extended

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the current corporate tax surcharge of 1.3 percent for another year, and the tax burden of Japanese firms has been growing over the last five years, while other countries have sought to reduce taxes on business. MITI has publicly called for an improved depreciation schedule to bring Japanese depreciation practices in line with those of its major competitors. []

The Prime Minister's Advisory Taxation System Council and the Liberal Democratic Party's Taxation System Research Council are engaged in an ongoing review of Japan's tax system. In addition to the retention of the corporate tax surcharge, tax changes proposed for 1986 include: restrictions on tax-loss carryforwards, introduction of a transfer tax on Japanese multinational corporations to prevent tax evasion, and an increase in the tax deduction granted to small businesses acquiring high-tech equipment. Prime Minister Nakasone has indicated that sweeping tax reform—including personal and corporate income tax cuts—will be implemented in the 1987 fiscal year (1 April 1987 to 31 March 1988). As part of the reform, press reports indicate the ruling Liberal-Democratic Party will introduce a 3.5-trillion-yen (\$17.5 billion) tax-cut plan later this year that may include 1.0 trillion yen (\$5 billion) for corporate tax cuts. A large-scale indirect tax (for example, sales tax or value-added tax) may be introduced, and tax preferences and exemptions currently given to interest income may be reduced to replace the lost revenue.¹⁴ The 1987 tax reform, if implemented as currently envisioned, would provide Japan's major corporate taxpayers substantial reductions, thus augmenting their cost of capital advantage and cash flow. The tax reform package—particularly the VAT component—will generate heated debate in the Diet. We expect little real movement on these issues before 1988. []

¹⁴ According to Ministry of Finance (MOF) figures, outstanding tax-free holdings now average 2.22 million yen (\$11,000) per person in Japan. Under the present tax code, individuals may place up to 15 million yen (\$75,000) in tax-exempt savings accounts. Parents may also place up to 600,000 yen (\$3,000) in each of their children's tax-free accounts each year. Moreover, interest earnings on mortgage bonds and installment time deposits are treated as miscellaneous income. The first 200,000 yen (\$1,000) of miscellaneous income each year need not be reported. []

United Kingdom. 1986 marks the third and final year of London's massive tax reform effort. This year, the corporate tax rate will drop to 35 percent and the current accelerated depreciation system will be phased out. BL, which has large tax-loss carryforwards, should be relatively unaffected in the short term by the tax reform. Assuming the Thatcher government follows through on its pledge to protect depreciation writeoffs for high-tech assets, the marginal tax rate of ICL and other high-technology firms should fall. Future tax cuts are targeted largely for individuals but will be contingent on North Sea oil revenues and the success of the Thatcher government in achieving further spending cuts. []

West Germany. Debate on Bonn's program of corporate tax relief will not begin until after the 1987 election. However, the ruling Christian Democratic Union/Christian Social Union/Free Democratic Party (CDU/CSU/FDP) coalition has put forward a proposal that calls for a two-stage tax cut in the early 1990s. The tax cut is likely to include a reduction in the corporate tax rate from the current 56 percent to less than 50 percent and the reduction or elimination of the wealth tax on businesses. These reductions will be partially offset by eliminating or trimming current tax writeoffs, reducing tax and expenditure subsidies, and avoiding excessive depreciation rates for investment.¹⁵ While the proposal will provide an economy-wide tax cut, individual firms could face a tax increase or decrease, depending on the specifics of the final package. Bonn is also expected to encourage innovation and risk-taking through more favorable loss treatment and reduction of the wealth tax (Vermögenssteuer), and removal of the stock exchange transaction tax, the company tax (Gesellschaftsteuer), and the trade tax (Gewerbesteuer) when acceptable substitutes are found. Small high-technology

¹⁵ An FRG report puts tax and expenditure subsidies by all levels of government in 1985 at DM 78.5 billion; a recent study by the Kiel Institute estimates subsidies at DM 121.5 billion. Moreover, Kiel's analysis shows a major increase in subsidies since the early 1980s, whereas government reports have excluded more and more of the actual subsidies available. []

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and service firms should benefit from these measures as well as general tax-rate reductions, but it is too early to predict the impact of West German tax reform on major firms like Siemens and Volkswagen that have reaped large rewards from Bonn's accelerated depreciation programs. Moreover, the prospects for significant tax reform are tied to the electoral fortunes of the CDU/CSU/FDP. [REDACTED]

Implications for the United States

Changes in relative tax burdens alter the abilities of firms to finance investments and R&D. Reductions in the relative burden of Japanese firms and little or no future tax liability for European firms will enhance their ability to fund needed capital investments and to compete with US industry. US tax reform proposals are designed to shift the tax burden from individuals to corporations while leveling the playing field between sectors by reducing tax rates and scaling back tax preferences. The impact of these changes will depend on what other countries, especially Japan, do. [REDACTED]

The relative tax burden on Japanese corporations could drop substantially if reform measures currently under discussion in Tokyo are carried out. Corporate tax reductions in Japan, combined with corporate tax increases in the United States, could restore the tax advantage enjoyed by foreign firms in the 1960s and 1970s and harm the competitiveness of US industry. US mature industries, in particular, could see their tax advantage turned into a disadvantage if reform occurs in both countries. In the absence of major changes in the Japanese tax code, however, US high-technology firms could reap important advantages from tax reform, although the impact on increasingly capital-intensive semiconductor manufacturers is uncertain. [REDACTED]

[REDACTED]

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In the absence of major changes in the Japanese tax code, US high-technology firms could reap important benefits from tax reform efforts—although the impact on merchant semiconductor manufacturers is less certain. Because of their need to continually update technologically obsolete equipment, semiconductor firms benefit greatly from investment and R&D incentives and are particularly susceptible to tax policy changes because of their increasing capital intensity. Although taxes are only one determinant of competitiveness, tax policy plays a particularly important role for US high-technology firms because they, unlike their foreign counterparts, must finance almost all their investments and R&D out of aftertax earnings. As a result, tax changes that reduce the incentive to engage in risky activities could seriously hamper their future ability to compete. [REDACTED]

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[REDACTED]

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Greater neutrality in US tax regulations would provide US industry with a tax environment similar to that enjoyed in practice by foreign corporations. Moreover, increased neutrality of the US tax system could be a significant plus for high-technology firms in the long term, although their short-term competitiveness will rest largely on the immediate impact of tax reductions or increases. Lower corporate tax rates would allow risk-taking entrepreneurs to reap larger rewards from their efforts while capital recovery allowances based on true economic depreciation would encourage the flow of capital from declining to growing sectors. Neutral tax regulations would therefore allow the free market to direct the flow of investment capital—enhancing overall economic growth and efficiency.

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Appendix A

Measuring Tax Burdens: A Methodology

In this paper we compare three measures—the marginal effective tax rate, the average effective tax rate, and the ratio of taxes to sales—to analyze the impact of corporate taxes on investment in France, Italy, Japan, the United Kingdom, West Germany, and the United States. Each measure has advantages and disadvantages:

- The marginal effective tax rate measures the tax bite on each additional dollar of investment; it is generally considered the best measure of the incentive impact of taxes, but cannot be designed to include every feature of the tax code.
- The average tax rate is a measure of the impact of taxation on the firm's cash flow; it takes into account all features of the tax code (including past provisions) but may not be a good measure of the incentive to make new investments.
- The ratio of taxes to sales is preferred by many analysts over the average effective tax rate since it is less subject to differences in international accounting and financial structure, but the economic meaning of this measure is less precise.

For any set of circumstances, one measure may provide a better indication of the tax burden; there is no best measure suitable for all circumstances. Our measures should be interpreted more as the relative benefit of foreign systems as compared with the US tax system, rather than as absolute indicators of "the" tax burden in each country. We use the US tax system as the baseline in calculating both the marginal and average effective tax rates.

Marginal Effective Tax Rate

The marginal tax rate measures the impact of current tax rules on planned investments. Tax changes which decrease the marginal rate—lower nominal rates, increased depreciation allowances, special investment

incentives—encourage investment, while changes which increase the marginal rate discourage investment. In calculating marginal rates a number of assumptions must be made—the expected inflation rate, the desired aftertax rate of return, how the investment will be financed, and how the profits from the investment will be distributed among others.¹⁶ A crucial assumption as to whether the marginal rate is a valid measure of future tax liability is that the investment will earn sufficient profits to take advantage of all tax incentives to which the investment is entitled and that future profits are not sheltered by past losses. If a firm has large tax-loss carryforwards or anticipates little taxable income, either because the investment is highly leveraged (financed mostly with debt) or is very risky, the average tax rate could be a better measure of the expected tax burden.

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In the absence of any taxes or subsidies, investors expand their capital outlays until the return on investment gross of depreciation, c , equals the cost of capital equipment, q , times the rate of return on funds invested elsewhere, r , plus the real rate of capital depreciation, d :

$$(1) c = q(r + d).$$

Generally speaking, taxes reduce the return on investment and discourage investors from undertaking marginal projects. This effect may be partially or fully offset, however, by direct subsidies, such as an investment tax credit, or by indirect measures, such as accelerated depreciation allowances.

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¹⁶ We calculate the marginal effective tax rate for domestic investment intended for in-country use and thus subject to tax regulations for domestic income. The tax code provisions used are those generally available as of 31 December 1985 (appendix B). The impact of more narrow tax provisions is reported in footnotes to the tables. In calculating statistics, we make those assumptions which would generally result in higher foreign tax burdens relative to the US tax burden so that any foreign advantage (disadvantage) is understated (overstated).

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Investment will take place until the aftertax return equals the aftertax cost to the investors:

$$(2) (1-u)c = q(r+d)(1-uz^*-f).$$

u is the nominal tax rate, so $(1-u)c$ measures the aftertax return on investment. f is the portion of new capital outlays directly subsidized by the fiscal system through investment tax credits, cash grants, and so on. z^* represents the present discounted value of all future depreciation deductions from taxable income as a proportion of current capital outlays. uz^* represents the present value of the tax savings arising from future depreciation and, thus, the fraction of current capital outlays indirectly "paid for" by the tax system. $1-uz^*-f$ indicates the fraction of the cost of new investment which is borne by the investor rather than by the fiscal system.

Using equation (2) we can develop a cost-of-capital index, I , defined to be the required rate of return on capital as a share of the cost of capital:

$$(3) I = 100(1-uz^*-f)/(1-u).$$

In the absence of direct subsidies to new investment, the cost-of-capital index will equal 100 if no taxes are imposed, or if new investment expenditures can be immediately and fully deducted from taxable income. The cost-of-capital index will be larger the higher the tax rate, the slower the rate of depreciation for tax purposes, and the smaller the investment tax credit or other direct subsidies.

We define the marginal effective rate of taxation, u^* , to be that rate of taxation which, without the aid of accelerated depreciation, investment tax credits, cash grants, and so on, would have produced the same cost-of-capital index as the tax system did:

$$(4) 100(1-uz^*)/(1-u^*) = I,$$

where z is the present discounted value of real depreciation expenses as a fraction of current capital outlays. Because real depreciation expenses are difficult to ascertain under the best of circumstances and

virtually impossible to calculate for foreign firms, we define z to be the present discounted value of depreciation expenses that would be allowed if the firms were operating under the US tax code. In this way we can establish fairly accurate comparable marginal tax rates.

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Equations (3) and (4) can be combined, and the effective rate of taxation can be shown to equal the nominal rate of taxation less a term which depends on the rate of depreciation allowed in the foreign country relative to the United States and on the size of investment tax credits or other direct subsidies to new investment:

$$(5) u^* = u - (1-u)(u(z^*-z)+f)/(1-z-u(z^*-z)-f).$$

Individual country assumptions and the values of z^* and z employed are reported in table 3.

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If a country alleviates the double taxation of dividend income through a split-rate system, a dividend-credit system, or a hybrid of the two, the effective nominal tax rate (table 4) depends on the rate of dividend distribution:

$$(6) u = p(1-g)u_d + (1-p)u_r.$$

p is the portion of pretax income to be distributed as dividends,¹⁷ g is the portion of the underlying corporate tax on dividends for which the shareholder may claim a tax credit, u_d is the nominal tax rate on distributed income, and u_r is the nominal tax rate on retained income.

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The relative value of depreciation allowances for equipment and structures varies substantially in each country. Therefore, we have calculated marginal tax rates for each asset group and have then calculated an

¹⁷ On the basis of the assumption that investments are expected to be profitable, we assume that the portion of income to be distributed as dividends will equal the level of distribution occurring in the firm's last profitable year. Relaxing this assumption does not significantly alter the calculated tax rates.

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Table 3
Country Data for Marginal Tax Rate Calculations

Percent

	Inflation Rate ^a	Aftertax Rate of Return	Present Value of Depreciation Allowances ^b			
			Equipment		Structures	
			z*	z	z*	z
France	5.8	2	86.8	79.6	43.4	58.5
Italy	10.7	3	71.9	68.1	56.6	43.3
Japan	2.0	2	82.3	88.6	55.3	74.2
United Kingdom	6.1	3	79.3	76.8	58.3	54.4
West Germany	2.2	4	83.6	83.2	46.0	64.3
United States	3.5	4	96.4 ^c	80.2	59.5	59.5


^a Increase in the consumer price index for 1985.

^b Present discounted value of depreciation allowances as a fraction of current capital expenditures used in equation (5). z* is the value conferred by the depreciation system of the given country assuming the quoted inflation rate and aftertax rate of return. z is the value conferred by the US depreciation system (ACRS without the investment tax credit) for the same inflation rate and aftertax rate of return. The difference between z* and z therefore approximates the net benefit of the foreign depreciation system relative to the US cost recovery system.

^c Incorporates the impact of the investment tax credit for purchases of equipment.




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overall firm marginal tax rate based on each company's most recent blend of equipment and structures purchases. To establish the overall marginal rate, we add the marginal effective tax rate on purchases of equipment weighted by the fraction of total current capital expenditures, which are defined as equipment to the marginal effective tax rate on purchases of structures weighted by the ratio of structures to total current capital expenditures (table 4). 

Since the corporate income tax is levied only on equity income, we weight the marginal tax rate by the portion of investments that the firm typically finances with taxable funds. This weight—the internal finance ratio (I)—is set equal to the maximum of 1.0 or the ratio of internal funds (net income plus depreciation minus dividends) to capital expenditures. To minimize

the impact of the business cycle on investment financing, we have used the average internal financing ratio for all available years. Hence, the overall marginal effective tax rate for the firm is:

$$(7) u^* = I(Eu_e^* + (1-E)u_s^*).$$

E is the portion of capital expenditures used for equipment and (1-E) the portion going for structures. u_e^* and u_s^* are the marginal tax rates for equipment and structures respectively as established through equations (5) and (6). In table 5 we report the marginal tax rates that would result if inflation were 5 percent and the desired aftertax rate of return were 4 percent in each country. 

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Table 4
Company Data for Marginal Tax Rate Calculations

Percent

	Dividend Payout Rate ^a	Effective Nominal Tax Rate ^b	Equipment- Structures Ratio ^c	Internal Finance Ratio ^d	Debt to Equity Ratio ^e
France					
Thomson	0	50.0	75	54	3.26
Peugeot	10	47.5	84	22	2.32
Renault	2	49.5	81	29	2.62
Italy					
Olivetti	24	42.6	86	87	1.99
Fiat	30	41.6	92	97	1.33
Japan					
Fujitsu	8	56.9	81	83	0.63
Hitachi	7	57.1	79	100	0.59
NEC	14	56.1	79	61	1.43
Nissan	11	56.5	77	100	0.47
Toyota	6	57.2	87	100	0.08
United Kingdom					
ICL	18	36.9	91	65	0.39
BL	0	40.0	95	22	1.18
West Germany					
Siemens	21	51.7	90	76	1.92
Volkswagen	11	57.3	93	63	1.54
United States					
Hewlett-Packard	5	50.3	52	100	0.12
IBM	28	50.3	71	79	0.19
Motorola	19	50.3	76	97	0.23
Texas Instruments	19	50.3	50	87	0.23
Chrysler	1	50.3	80	83	1.43
Ford	15	50.3	100	80	0.80
General Motors	33	50.3	85	94	0.48

^a Share of pretax earnings paid out as dividends in the company's last profitable year. Data for US corporations reported for comparative purposes only—US firms receive no double taxation relief.

^b Incorporates national and subnational nominal tax rates, double taxation relief, and the rate of dividend distribution. See equation (6).

^c Net investment in equipment as a share of total capital (equipment plus structures) expenditures. Ratio is for the latest available year.

^d Share of capital expenditures financed with internal funds; maximum of net income plus depreciation minus dividends, all divided by capital expenditures or 100. To reduce the impact of cyclical fluctuations, we have used the average of all available years.

^e Long-term debt as a share of stockholder's equity; reported for comparative purposes only.



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Table 5
Marginal Tax Rates With Common Inflation
and Desired Rate of Return Assumptions ^a

Percent

	Equipment	Structures	Total
France			
Thomson	21.2	31.0	23.7
Peugeot	8.1	12.1	8.7
Renault	11.3	13.6	11.7
Italy			
Olivetti	34.3	29.5	33.6
Fiat	37.3	31.6	36.8
Japan			
Fujitsu	53.1	54.2	53.3
Hitachi	64.2	65.4	64.5
NEC	38.6	39.4	38.8
Nissan	63.6	64.9	63.9
Toyota	64.3	65.5	64.5
United Kingdom			
ICL	22.3	22.7	22.3
BL	8.3	8.4	8.3
West Germany			
Siemens	38.7	45.4	39.4
Volkswagen	35.6	41.0	36.0
United States			
Hewlett-Packard	23.8	50.3	36.5
IBM	18.8	39.7	24.9
Motorola	23.1	48.8	29.3
Texas Instruments	20.7	43.8	32.3
Chrysler	19.8	41.7	24.2
Ford	19.0	40.2	19.0
General Motors	22.4	47.3	26.1

^a Marginal tax rates are calculated using the same company data and tax regulations as those employed for table 1. Calculations assume a common inflation rate, 5 percent, and desired aftertax rate of return, 4 percent, in each country.

Average Effective Tax Rate

Average tax rates (table 6)—observed corporate taxes divided by “correctly measured” corporate income—measure the actual past burden of taxes on a firm. The approach of examining actual past tax burdens

may be particularly relevant to a relatively new firm or a firm that has had several years of losses. Firms with little or no taxable income may be unable to take advantage of tax incentives, making the average rate (which takes into account the actual history of the firm) a better measure of their tax burden. Moreover, marginal rates cannot be designed, as a practical matter, to account for all the complexities of the way in which actual taxes are affected by the myriad of existing provisions, such as graduated rate schedules, locational choices, export subsidies, and the like. These complexities are included in the average effective tax rate measure, but they might not affect taxes on the marginal investment.

We begin our calculation of average tax rates with a comparison of country nominal tax rates and the amounts that companies claim as their actual tax expense. The latter amount—reported tax expense divided by reported earnings before tax—is frequently reported in corporate annual reports as the firm's tax burden or effective tax rate. As a result of various tax credits—investment tax credits, dividend credits, research and development credits—and profits subject to reduced tax rates in foreign countries, the reported burden is generally less than the nominal tax rate. In some instances, however, the reported burden is higher than the nominal rate because of additional taxes imposed on certain expenses—for example, entertainment expenses—and/or expenses claimed for financial purposes that are not allowed for tax purposes, such as excessive allowances for severance payments.

Accounting differences or methods of financial reporting can affect the amount of tax savings open to public inspection. Japan, West Germany, and France use the current method of financial reporting whereas the United States uses the deferred tax accounting method. Under the current method, the tax expense shown on the published financial statement is equal to the tax actually paid out in cash that year. Moreover, the reported profits of companies that structure their accounting records to minimize tax, notably those in West Germany and France, will generally bear no relation to true economic profits.

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Table 6
Average Corporate Tax Rates—Company Data
Averages for 1979-83 ^a

	Nominal Tax Rate ^b	+ Net Credits ^c	= Burden per Annual Report	+ Differences From US GAAP ^d	+ Deferrals ^e	+ Depreciation ^f	= Effective Tax Rate	+ Interest Adjustments ^g	= Average Tax Rate
France									
Thomson	50.0	NM ⁿ	NM	NM	NM	NM	NM	NM	8.8
Peugeot ^h	50.0	NM	NM	NM	NM	NM	NM	NM	NEGL
Renault ⁱ	50.0	NM	NM	NM	NM	NM	NM	NM	NEGL
Italy ^j									
Olivetti	40.5	(7.8)	32.7	0	0	(8.7)	24.0	(14.6)	9.4
Fiat	42.5	8.5	51.0	0	0	(6.1)	44.9	(32.4)	12.5
Japan									
Fujitsu	55.7	(1.1)	54.6	1.6	0	(6.5)	49.7	(6.9)	42.8
Hitachi	54.8	(3.3)	51.4	0	1.4	0	52.8	(12.0)	40.8
NEC	54.8	1.5	56.3	0	2.5	(1.8)	57.0	(25.8)	31.2
Nissan	55.3	1.4	56.7	0	(0.9)	0	55.8	(16.5)	39.3
Toyota	55.6	(3.1)	52.5	(4.0)	0.1	0	48.6	0.0	48.6
United Kingdom									
ICL	50.0	(22.2)	27.8	0	(6.5)	(8.2)	13.1	(6.0)	7.1
BL ^k	50.0	(39.5)	10.5	0	(2.0)	0	8.5	(4.5)	4.0
West Germany									
Siemens	63.5	(3.2)	60.3	(2.0)	0	(12.2)	46.1	(12.4)	33.7
Volkswagen	63.5	51.0	114.5	(30.6)	0	(40.8)	43.1	(19.6)	23.5
United States									
Hewlett-Packard	48.7	(3.2)	45.5	0	(6.7)	0	38.8	(1.9)	36.9
IBM	47.5	(2.8)	44.7	0	(2.4)	0	42.4	(1.8)	40.6
Motorola	48.0	(21.3)	26.7	0	0.7	0	27.4	(3.7)	23.7

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Table 6 (continued)

	Nominal Tax Rate ^b	+ Net Credits ^c	= Burden per Annual Report	+ Differences From US GAAP ^d	+ Deferrals ^e	+ Depreciation ^f	= Effective Tax Rate	+ Interest Adjustments ^g	= Average Tax Rate
Texas Instruments	46.0	(5.3)	40.7	0	1.3	(6.8)	35.2	(3.1)	32.1
Chrysler ^h	46.6	(44.6)	2.0	0	(0.8)	0	1.2	(0.1)	1.1
Ford ^m	48.0	(16.6)	31.4	0	1.5	0	32.9	(3.7)	29.2
General Motors ^m	47.5	(18.9)	28.6	0	2.3	0	30.9	(3.9)	27.0

^a Data for Thomson, 1983 only; for Olivetti, 1981-82; for Fiat, 1981-83; for Fujitsu, 1979-85; for Nissan, ICL, and Motorola, 1979-84; for Toyota, 1980-84; for IBM, 1978-83; for Texas Instruments, 1978-82.

^b Reflects national, state, and local income taxation.

^c Credit adjustment includes tax credits for R&D, investment, earnings distributed as dividends, and the effect of lower taxation on foreign earnings, net of tax on nondeductible expenses.

^d Differences from US GAAP are only those which are quantifiable from financial statements.

^e Adjustment for deferral is based on the increase (decrease) in current tax liability as reported in the statement of changes in financial position. Tax deferrals in the United States result largely from depreciation for tax purposes at rates higher than those reported for financial statement purposes. The adjustment for Japan is net of allowances for severance liabilities in excess of those allowed for tax purposes. Deferred tax liability not recognized in Italy and West Germany.

^f The adjustment for depreciation is, in the case of Japan, the excess amount claimed by those companies over what a comparable US company would charge. Japanese depreciation for tax and financial purposes is generally identical. In the case of Germany the adjustment is for special depreciation which is over and above normal depreciation and is not reflected in asset accounts. The depreciation adjustment for Italy is for special depreciation granted under Italian Law no. 72 of 19 March 1983.

^g The interest adjustment is based on interest expense as reported in company financial statements.

^h Peugeot has paid little or no taxes since 1979. Large loss carryforwards make it unlikely that the company will face any significant tax burden in the near future. In Peugeot's last profitable year (1979) the firm's average tax rate was 26.5 percent.

ⁱ As a result of large losses, Renault has paid little or no taxes since 1980 and large loss carryforwards make it unlikely that the company will face a significant tax burden in the near future. In Renault's last profitable year (1980) the firm's average tax rate was 19.4 percent.

^j The Italian national (IRPEG) tax rate was increased from 30 to 36 percent and an 8-percent surcharge was imposed on the local (ILOR) income tax rate of 15 percent in 1983, increasing the nominal tax rate from 40.5 to 46.4 percent.

^k Based on 1984 only; as a result of large losses BL paid little or no taxes during 1979-83.

^l Based on 1984 only; as a result of large losses and loss carryforwards, Chrysler has paid little or no taxes since 1978.

^m Based on 1984 only; as a result of large losses and loss carryforwards, Ford and GM paid little or no taxes during 1980-83.

ⁿ Not meaningful.

We were unable to totally convert financial reports for several companies to US GAAP, but several major deviations were established and at least partially corrected for—notably Siemens's and Volkswagen's use of special reserves, Volkswagen's treatment of interest expense for capital investments, and Toyota's accounting for severance benefits and investments in affiliates and suppliers. Nonquantifiable differences

from US GAAP may cause understatement or overstatement of the resulting rates, but we believe that the remaining distortion is minor. We also converted financial reports to the current method of accounting; this eliminates deferred taxation. Tax liability, as used in calculating average tax rates, is therefore

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actual tax payments—reported tax expense plus or minus the change in deferred tax liability (as reported in the statement of changes in financial position).

To establish a more accurate measure of the company's economic profits, we next adjusted for special or excessive depreciation allowances. Special depreciation for West German firms is calculated as the difference between depreciation as claimed on the income statement and that reported on the statement of changes in financial position. For Italian firms the adjustment is for special depreciation granted under Italian Law No. 72 of 19 March 1983, which was designed to compensate for the impact of inflation. For Fujitsu, ICL, NEC, Thomson, and Texas Instruments (TI), a partial adjustment is made for the excess of depreciation over that claimed by a comparable US firm (IBM for Fujitsu and ICL, Motorola for NEC, Thomson, and TI).

After making the above adjustments and arriving at the "effective tax rate," adjustments were made for the large cross-country (and cross-company) differences in the reliance on debt capital. To arrive at what might be called the economic income of the firm, interest expenses were added to adjusted earnings before tax. The former represents the return to debt capital; the latter represents the return to equity capital. Our average tax rate, therefore, gives the tax burden on the entire financial assets of the firm (much like the summary measure of taxes as a share of sales). Companies that rely relatively little on debt capital (and are thus unable to take advantage of interest deductibility) will have average tax rates quite close to their effective rates. On the other hand, companies that have relatively small equity bases (and, thus, low tax bases) will have average tax rates much lower than their effective rates. To minimize the impact of the business cycle on the tax rate as well as that of loss and credit carryforwards and carrybacks, statistics are reported as five-year averages where sufficient data exist (significant exceptions are noted in footnotes).

Ratio of Taxes to Sales

The ratio of taxes to sales is the simplest indicator of the drain that taxes place on a firm's resources. Many analysts feel that it is the best measure of the tax burden for international comparisons because it is independent of the firm's financial structure and less influenced by international accounting differences. To minimize the impact of year-to-year fluctuations in the ratio and to assure comparability with the average effective tax rate we calculate averages of the ratio over the same time period for which the average rate is calculated. Taxes represent actual taxes paid, and sales are gross revenues (net of VAT for European firms).

Unfortunately, the ratio of taxes to sales is a poor indicator of the impact of tax incentives on investment, and there is no necessary relation between sales and other meaningful economic aggregates such as profits or pretax income. Hence, for any given level of sales, the measure will be higher for some industries simply because some industries are more profitable. For example, high-technology firms tend to be more profitable than mature firms, at least in part because greater returns are required to compensate for greater risks. Moreover, the ratio will tend to be higher for US firms because US firms are traditionally more profitable than foreign firms. The greater profitability of US firms may result from better management, a need to report high short-term profits (while foreign firms take a longer term perspective), or, in the case of US auto firms, a product line dominated by large cars that have greater profit margins.

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Appendix B

Corporate Tax Systems

	Nominal Income Tax Rates			Depreciation		Investment and R&D Incentives ¹		Regional Incentives	Foreign Earnings	Inventory Valuation Methods	Loss Provisions	Consolidation Provisions
	National ^a	Subsidiary ^b	Retained Earnings	Normal	Special	R&D	Investment					
France	50 ^a	50	None	Straight-line method required for buildings but declining balance may be used for machinery and equipment; rates are multiples of straight-line rates depending upon asset life. Typical useful lives are 20 years for industrial buildings, 10 years for machinery and equipment.	Buildings for scientific research are eligible for a 50-percent first-year writeoff. Additional first-year depreciation of 40 percent or more (depending on useful life) of the standard double-declining balance rate is allowed for industrial equipment purchased during 1983-85.	50 percent of net annual increase in R&D expenses (increased from 25 percent in 1985). Deduction allowed for 50 percent of the cost of shares in government approved research companies.	Five percent investment tax credit is available this year if equipment is maintained or increased.	Concessions through DATAR include partial or total exemption from local business taxes for up to 5 years, reduction of transfer taxes, and accelerated depreciation on new construction.	Foreign earnings are generally exempt from taxation. 95 percent of dividends received from firms in which the French company holds a 10-percent interest may be excluded from taxable income.	Lower of average cost or market. LIFO not allowed, but market fluctuations reserves may be established under certain conditions.	Losses may be carried forward five years (those attributed to depreciation may be carried forward indefinitely). Loss carrybacks are not permitted.	Consolidated tax returns rarely allowed.
Italy	36.0 ^a	36.0	10.4 ^c	Normally, the straight-line method must be used. Specific rates are set by the government. Typical maximum rates include: buildings—3 to 7 percent and machinery and equipment—6 to 17 percent.	Accelerated depreciation of up to 15 percent of cost may be claimed during the first three years. From time to time the government allows depreciation to be adjusted for the impact of inflation.	None	None	Tax incentives including full or partial exemption from local and national income taxes for periods of up to 10 years are available for investments in Southern Italy (the Mezzogiorno), and in certain other depressed areas.	Per-country limitation applied to foreign tax credits. All foreign income is exempt from local taxation. 60 percent of foreign dividends may be excluded from income if there is a 10-percent interest.	Lower of cost or market. LIFO is the most common method used.	Losses may be carried forward five years for national tax purposes, but not for local income tax purposes. No loss carryback is permitted.	Consolidated tax returns are not allowed.
Japan	43.3 ^a	33.3	14.7 ^c	Straight-line or declining-balance. Useful lives are prescribed by statute, but typical useful lives are: buildings, 45 to 65 years; machinery and equipment, 5 to 15 years.	Special Tax Measures Law provides for additional first-year depreciation of 30 percent for specified high-technology assets.	20 percent of increase in R&D expenses over highest previous level may be taken as a credit.	A 7-percent tax credit may be taken instead of 30-percent special depreciation for high-technology assets. Small companies are eligible for an additional 6-percent credit on the purchase of selected high-technology devices.	Incentives include 15- to 30-percent special depreciation in designated areas. Preferential tax measures are also used by some facilities to attract foreign investment.	Tax credits for foreign tax paid with worldwide limitation. Foreign income is exempt from local income taxation. Firms may claim credit for taxes that would have been paid had special incentives not been available in "tax holiday" countries.	Cost or lower of cost or market. Most electronics and automobile firms use LIFO.	Losses may be carried forward five years and back one for firms filing "blue form" returns.	Consolidated tax returns are not allowed.
United Kingdom	40 ^a	40	None	Equipment may be written off at a 25-percent rate using the declining balance method. Buildings may be written off on the straight-line method at an annual rate of 4 percent.	Equipment purchases are currently granted a 50-percent first-year writeoff and buildings a 25-percent initial writeoff. This system will be phased out in 1986 when overall tax rates are reduced.	None	None	Investments in enterprise zones may qualify for 15-percent tax-free grants and depreciation allowances of up to 100 percent of the cost of new equipment and buildings.	A per-country limitation is applied to the foreign tax credit. Excess credits may not be carried forward or backward to any other accounting period.	Lower of cost or not realizable value. LIFO and first-in, first-out methods may not be used.	Losses may be carried back one year and forward indefinitely (those due to accelerated depreciation may be carried back three years).	Consolidated tax returns are allowed if a 75-percent ownership test is met.
West Germany	56 ^a	36	7.5 ^c	Declining-balance (maximum of 30 percent or three times straight-line rate, whichever is lower) or straight-line method; typical useful lives are: 5 to 10 years for machinery and equipment, 20 to 30 years for buildings. Straight-line must be used for old buildings.	None	R&D investments can qualify for special depreciation of 40 percent (35 percent for buildings) during the first five years in addition to regular depreciation.	Investments of less than DM 500,000 receive a tax-free subsidy of 30 percent and 7.5 percent for larger investments.	Plant and equipment located in West Berlin and East German border regions are eligible for accelerated depreciation. Firms located in West Berlin receive a 40-percent tax-free subsidy (30 percent for investments larger than DM 500,000).	Tax credits for foreign tax paid with per-country limitation. Foreign income is exempt from local income taxation. Firms may claim credit for taxes that would have been paid had special incentives not been available in "tax holiday" countries.	Lower of cost or market. Actual or average cost generally used. FIFO and LIFO usually meet permitted for tax purposes.	Losses may be carried forward five years and up to DM 10 million may be carried back two years.	Consolidated tax returns allowed only after complex procedures have been met.
United States	46 ^a	46	4.3 ^a	Straight-line, declining-balance, and sum-of-years digits. Under ACIRS, assets purchased after 1981 are assigned to one of four classes, with standard tax lives of 3, 5, 10, or 15 years. ^d	None	A tax provision, providing a 25-percent credit for the increase in R&D expenditures over the average of the previous three years, expired at the end of 1983. ^e	Up to a 10-percent credit for investments in qualified property, subject to annual limitations (unused credits may be carried back three years and forward 15 years).	Available from state and local governments on a case-by-case basis.	Tax credit for foreign tax expense with worldwide limitation.	Cost or lower of cost or market. All major methods allowed.	Losses may be carried forward 15 years and back three.	Consolidated tax returns are allowed if an 80-percent ownership test is met.

^a Tax base is annual worldwide income, except for France, where the base is income earned in France plus 5 percent of dividends received from subsidiaries (foreign and domestic).

^b Subsidiary income tax rates are quoted net of any advantage gained through deductibility at the national level. Most local governments levy property and various use taxes that are generally immaterial relative to income taxes, but may affect income tax rates.

^c All tax countries allow R&D costs to be immediately expensed.

^d A 30-percent surtax is imposed on certain expense items. Branches of foreign corporations are liable for a 25-percent surtax on distributed profits (unless reduced by treaty) in addition to regular corporate taxation. The French imputation system provides a 30-percent credit to individuals for corporate taxes deemed to have been paid on dividends.

^e The tax on capital gains from the disposal of fixed assets can be deferred if the gain is reinvested in fixed assets within two years. The deferred gain reduces the depreciable base of the replacement assets. Resident shareholders of resident corporations are entitled to a tax credit equivalent to nine-sixteenths of their dividend.

¹ The local income tax (ILOR) of 16.2 percent is deductible for national tax purposes. ILOR is levied only on domestic income.

² Branches of foreign corporations are taxed only on Japanese-source income, but do not receive credit for distributions. Shareholders receive a tax credit equivalent to 10 percent of their dividends.

³ Preferential and municipal (income) taxes average 26.7 percent of the national tax and enterprise tax rates range from 6 to 17.2 percent of taxable income. Together with the national income tax, these taxes result in a minimal effective rate of 24 percent.

⁴ The 20-percent general R&D tax credit is limited to 10 percent of tax expense. The combination of the general credit, the 7-percent credit for high-technology assets, and the additional 6-percent credit for small companies may not exceed 15 percent of tax expense. Excess credits qualify for normal carryback and carryforward provisions.

⁵ The corporate tax rate will drop to 35 percent for the year ending 31 March 1987. Entertainment expenses, other than for foreign customers and staff, are not deductible. Capital gains from the disposal of assets are taxed at 30 percent, but the tax may be deferred if the proceeds are reinvested in other business assets. When a company owns a dividend it is required to reinvest for advance corporation tax (ACT), which is currently three-sevenths of the dividend paid. The company is able to offset ACT against its corporation tax liability up to a maximum of 20 percent of its taxable income in the year the dividend is paid. Surplus ACT may be carried back six years or forward indefinitely.

⁶ Branches of foreign corporations are taxed at 50 percent on all profits, whether distributed or not, plus local tax. The German imputation system provides a 100-percent credit to individuals for corporate taxes deemed to have been paid on dividends. Trade (fixed) annual tax rates vary depending on location, but average 17 percent. Factoring in deductibility at the federal level results in a 7.5-percent increase in nominal tax rates.

⁷ Capital gains taxed at a maximum rate of 28 percent. A 15-percent surtax, called the add-on minimum tax, is imposed on preference items; deductions for charitable contribution may not exceed 10 percent of taxable income.

⁸ State income tax rates range from 0 to 12 percent; a few cities also levy income taxes. State and local income taxes, deductible for federal tax purposes, increase the marginal effective tax rate to 50.1 percent, on average.

⁹ Typical useful lives for assets purchased before 1981: buildings, 25 to 40 years; equipment, 5 to 12 years.

¹⁰ Proposals currently under consideration would further restrict qualifying research activities and reduce the tax credit to 20 percent. The proposals, however, would extend the credit retroactively to the beginning of 1986 and make the credit available for research activities carried out by universities.

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